



Dredging Research Technical Notes



Point Load Index and Unconfined Compressive Strength Data Base System

Purpose

The Point Load Index and Unconfined Compressive Strength Data Base System (PLUCS) was designed to store, retrieve, and compare rock test data. This technical note describes the PLUCS and gives its availability to the field. Earlier, PLUCS was available on request in a draft version for field personnel interested in point load testing or wet/dry strength comparisons. The earlier version required licensed use of additional software. PLUCS is now available as a complete system that can be executed without additional software. All earlier versions should be destroyed. To obtain a copy of PLUCS, complete the order form at the end of this note and return it to the address given on the form.

Background

Dredging contractors' claims are often based on material strength changes. The point load test allows for quick on-site monitoring of dredged material strength. The point load test also has potential in dredging exploration because tests can be performed on core immediately while material is in as-taken condition without the usual precautions for handling and storage.

The point load test was originally developed to provide a strength index for hard rock materials in the field using a small hand-portable test apparatus, and the point load index, I_s , has been used successfully during the past two decades for strength classification of hard rock materials. The point load index may be correlated with other common strength parameters such as unconfined compressive strength (UCS). The test can be performed on the weaker, saturated materials typical of many coastal deposits. (See Technical Note DRP-2-01) Because of its availability and convenience in the field, some districts have already used the point load test on dredged material to obtain a general indication of relative strengths.

Correlation of point load index with UCS is material-type dependent, and such correlations are ideally based on a site study. UCS may be estimated by using data from tests on similar materials. Average correlation values are typically used in estimating UCS for reconnaissance exploration involving a limited number of tests. The use of previously published hard rock information to estimate UCS for weaker/saturated materials can easily yield results in error by a factor of two. The PLUCS provides data for material-specific correlations based on tests performed on both dredged material and on other saturated rock materials selected for uniformity. The comparative testing program on which PLUCS is based included both wet and dry tests so that wet/dry comparisons could be made of both material strengths and UCS to I_s correlation factors.

Additional Information

Contact the author, Mr. Hardy J. Smith, (601) 634-2431, or the manager of the Dredging Research Program, Mr. E. Clark McNair, (601) 634-2070.

Description

The PLUCS data base contains results from over four hundred rock tests from ten different material sources. PLUCS provides summary data of individual test results. Additional information, such as complete stress-strain plots or more complete material descriptions, is available from the US Army Engineer Waterways Experiment Station, Vicksburg, MS. In addition to displaying data of individual tests, the PLUCS will, for a specified material and/or source location, compute average strengths, wet/dry strength ratios, and unconfined compressive strength versus point load index correlation factors.

Most point load index tests in this data base were performed on NX-sized (2-1/8 inch) samples, a size commonly used by the US Army Corps of Engineers. The point load index strength, I_s , is influenced by sample size. Therefore, for strength comparison or rock classification purposes the index must be corrected to a standard size. Point-load index values for smaller or larger samples are automatically corrected to NX size when data are entered in PLUCS.

Using PLUCS

The PLUCS Data Base System is a complete system that can be executed without additional software and can be executed on any IBM-compatible microcomputer (PC). The data base contains results of a large number of tests, but for some materials a very small number of samples was available. Although the PLUCS software will compute and display results using any number of tests, strength comparisons based on a small number of tests may be unreliable. Judgement must be exercised based on the number of tests available, the variability of the material, and the intended use of the computed result.

Before using PLUCS, users should read Technical Note DRP-2-01, "Suggested Methods for Use of the Point Load Tester in Dredging Applications." In addition, users should also consult the following publications:

International Society for Rock Mechanics. 1985. "Suggested Method for Determining Point Load Strength," International Society for Rock Mechanics, Commission on Testing Methods, *International Journal of Rock Mechanics and Mining Sciences and Geotechnical Abstracts*, Vol 22, No. 2, pp 51-60.

US Army Engineer Waterways Experiment Station. 1982. "Proposed Standard for Determination of the Point Load Index for Rock," *Rock Testing Handbook*, RTH-325-82, Vicksburg, MS.

-----, 1989. "Suggested Method for Determining Point Load Strength," *Rock Testing Handbook*, RTH-325-89, Vicksburg, MS.

Dredging Research Program
Point Load Test and Unconfined Compressive Strength
(PLUCS)
Data Base System

— ORDER FORM —

Please send _____ copies of the PLUCS Data Base System to:

Name _____

Office Symbol _____

Mailing Address _____

Telephone Number _____

Please indicate what type of diskette you wish to have the inventory copied to:

_____ 5.25 inch/500 kilobyte _____ 3.5 inch/720 kilobyte

_____ 5.25 inch/1.6 megabyte _____ 3.5 inch/1.44 megabyte

Mail or fax this order form to:

Commander
USAE Waterways Experiment Station
ATTN: CEWES-CP-D/Tillman
3909 Halls Ferry Road
Vicksburg, MS 39180-6199
FAX Number: 601-634-2055

For further assistance, contact:

Hardy Smith, CEWES-GS-R, (601) 634-2431 (FTS 542-2431)
Russ Tillman, CEWES-CP-D, (601) 634-2016 (FTS 542-2016)